

BYE 6479-69  
Section 1

IDEALIST

DEVELOPMENT SUMMARY AND PROGRESS

(1 July 1969 - 30 September 1969)

I. AIRFRAME

25 YEAR RE-REVIEW

A. As a result of successful arrestment tests on Article 055, the U-2R was declared ready for qualification tests aboard a carrier.

B. U-2R FLIGHT TEST AND OPERATIONAL TRAINING SUMMARY

	<u>J.A.S. FLTS</u>	<u>J.A.S. TIME</u>	<u>TOTAL FLTS</u>	<u>TOTAL TIME</u>
1 - 051	29	102.9	156	489.8
2 - 052	--	--	58	215.0
3 - 053	24	78.6	127	447.0
4 - 054	27	92.6	133	470.9
5 - 055	19	61.0	129	458.4
6 - 056	--	--	24	55.6
7 - 057	40	119.9	153	553.7
8 - 058	42	116.6	145	471.5
9 - 059	21	43.4	37	70.0
10 - 060	2	4.3	24	44.9
11 - 061	--	--	17	31.8
12 - 062	<u>--</u>	<u>--</u>	<u>13</u>	<u>28.4</u>
TOTAL	204	619.3	1016	3337.0

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## II. PROPULSION

The flight test program to investigate the engine instability problem (primarily fluctuations of Engine Pressure Ratio) has been completed and excellent data obtained. Pratt and Whitney analysis of test data determined that the problem is caused primarily by excessive hysteresis in the speed governor system of the fuel control. Hamilton Standard, the fuel control vendor, is currently modifying a unit with changes which should eliminate the instability problem. This improved model will be flight tested as soon as it is available.

## III. PAYLOAD

A. IRIS II Configuration - A total of three (3) IRIS II configurations are now operationally ready (OR). Two are assigned to [ ] 25X1  
[ ] The manufacturer has delivered the last two configurations 25X1 to Detachment G, Edwards AFB, for testing. It is anticipated that all six (6) IRIS II's, including the Depot Spare, will be OR by the close of the next quarter.

B. "H" Configuration - H camera SN-002 was qualified to use the SO-230 emulsion and was subsequently shipped to [ ] along 25X1 with a modified hatch. The hatch was modified to improve ducting of air to the high oblique (upper) windows. Upon completion of SN-002 tests, SN-003 will be returned to Detachment G and placed in flyable storage.

C. Thermal Stabilization - Proposals for Q-Bay preconditioning carts have been received from Lockheed Aircraft Corporation (LAC), Hycon and Air Flow Company. Wide variance in cost estimates requires further analysis. Detailed cooling, heating, dehumidification and control parameters are being evaluated for accurate specification submission to the builder.

## IV. NAVIGATIONAL AIDS

A. Automatic Direction Finder (ADF) - A prototype 4 foot whip antenna has been developed and tested which improves the reception, sensitivity and reliability of the ADF system. Modification kits are now being developed for fleet wide installation.

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B. Identification Friend or Foe (IFF) Transponder - The high incidence of operational failures has been reduced by moisture proofing of components and the installation of a new design end bell assembly.

V. U-2R ELECTRONIC WARFARE SYSTEMS (EWS)

A. SYSTEM 12ER - Environmental studies conducted at the General Dynamics simulation facilities indicate that this system will perform acceptably in a multisignal environment. A modification in the record-all circuit has been added which improves the overall recorded detection capability for improved ELINT data outputs.

B. SYSTEM 13D - The system receiver will be repackaged to permit installation in the E-Bay. The system, without the gridded tube, is programmed for testing in the last quarter FY 1970.

C. SYSTEM 20 - Flight tests of the second production System 20 were completed and included a series of live intercept maneuvers. The system detected the afterburning interceptors and indicated their presence to the U-2R pilot with a high degree of reliability. Production systems are now installed on both articles at Detachment H.

D. SYSTEM 21 - A high receiver failure rate and poor antenna characteristics have been encountered in operational usage. A redesigned antenna for increased gain and improved directivity will be installed along with the ADF whip antenna. Use of new sealants and potting compounds plus vendor engineering improvements are being incorporated to insure receiver reliability and performance.

E. HF/BIRDWATCHER - The high failure rate of the HF antenna has been drastically reduced by the installation of an improved feed line which increases power carrying capability and moisture resistance and improves the mechanical coupling.

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F. OSCAR SIERRA, MARK III - During a recent Cuba overflight, an Air Force U-2R experienced red alert triggering of the OSCAR SIERRA system indicating the presence of an active SAM guidance signal. Analysis of L-Band data from the System 6B did not confirm the presence of a valid guidance signal to cause the activation and, therefore, available evidence is inconclusive. A further study of this problem is continuing with Air Force participation in an attempt to isolate the exact cause of this activation. Additionally, it has been recommended that an improved ELINT system, such as System 17B, be carried on future missions so that adequate data will be available for post flight analysis to confirm the source of OSCAR SIERRA triggers.

25X1

## VI. GENERAL RESEARCH AND DEVELOPMENT

### A. GENERAL R&D

1. Drag Reduction Program - The Cal Poly Wind Tunnel tests of basic components of the flow mechanism pertaining to the redesigned outer panel wing system were essentially completed. These models were hand-filed parts and the test effort was mainly oriented towards determining dominant parameters and basic trends as the first step. Even with these limitations, the results indicate a substantial progress with a maximum induced drag reduction of about 30 per cent at a lift coefficient of  $C_L = 0.5$ . However, to develop an optimum energy recovery wing system is extremely complex within the framework of existing analytical methods and conventional wind tunnel testing techniques. Further, a study of bird wing geometry indicates that this type of wing operates as an energy recovery wing via the vortex diffuser mechanism which explains its very high performance. To incorporate the advantages of a soaring bird wing in an aircraft wing requires detailed study of the bird wing in its soaring attitude which can be conveniently accomplished in a tilting bird wind tunnel. A proposal to conduct this study has been received and is being reviewed.

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2. High Altitude Relight Program - Two engines (Serial numbers 612621 and 611319) now have burner cans installed which have been modified to the sealed cross-over tube configuration for improved altitude relight capability. Both engines have been delivered from overhaul and will be used for a 200 hour flight service test.

25X1

4. U-2R Engine Performance Improvement - Funded studies have been completed by LAC on the effects of proposed J75-P-13B engine performance improvements on performance of the U-2R aircraft and a final report has been received. The LAC study indicates an engine growth step which could provide several possible aircraft performance improvements, such as, an increase of 1450 ft. in altitude with a slight reduction in total range but an increase of 500 nautical miles in range above 70,000 ft., or an increased payload capability of 2000 lbs. over the current mission profile with a slight loss in total range.

5. General Studies

a. Low Altitude, Quiet U-2R - The Lockheed preliminary investigation of the U-2 is nearing completion. The study indicates that a significant quieting can be obtained. The sound level is still somewhat above background noise at 200 feet; however, the ability to detect the presence of the aircraft will be markedly reduced. A development program would be required to solve some of the air inlet technical problems associated with quieting the U-2 without severely reducing the range of the aircraft and without reducing inlet and propulsion

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reliability. Further testing is programmed to determine if substantial quieting is, in fact, necessary for covert night-time penetration. Also, a very preliminary investigation was conducted of alternate approaches to accomplish a covert low altitude mission. The study indicated that there may be a number of existing commercial aircraft with the capability to perform a completely low altitude mission. The silencing problem for these aircraft would be considerably less complex than to silence the U-2 and, additionally, they could probably be silenced to a lower noise level. The trade-off, however, may be in range. The study of these alternate aircraft is continuing in greater depth and the results will be available during the next quarter.

b. Improved U-2R Navigation System - The Honeywell Corporation has completed the preliminary design effort of the Honeywell Update System interfaced with the U-2R doppler system to improve navigation accuracy. The estimated error build-up for this system is a maximum CEP of approximately 1 NM corrected to a CEP of 0.5 NM every 90 minutes.

c. U-2R Aircraft Performance Analysis - A thorough analysis of all U-2R operational aircraft fuel curve data collected to date is being conducted to evaluate U-2R aircraft and engine performance under actual operating conditions and to determine the extent of variations in performance of different aircraft and engine combinations. The results of this analysis will be published when the studies are completed and these results will be reviewed with aircraft and engine contractor performance engineers.

B. FORTUNE COOKIE - Essentially all of the requested Phase II FY 1970 funds were approved by the DNRO. Contracts have been awarded for the FORTUNE COOKIE vehicles and the various payloads. No major problem areas have been uncovered and the program is proceeding according to schedule.

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C. ADVANCED AERODYNAMIC RECONNAISSANCE SYSTEM

1. The Mitre Corporation is nearing completion of their survivable profiles and tactics investigation with the final report scheduled for completion by 30 October 1969. Some significant conclusions are emerging from this effort:

a. Any vehicle penetrating the Soviet defenses will have to face the end game, i. e. , will be shot at.

b. An aircraft flying at Mach 4.5 and 100,000 feet altitude and having a one g lateral acceleration capability can survive against either an SA-5 (Tallinn System) or a Galosh ABM with high explosive (HE) warheads.

c. A boost glide vehicle flying at 200,000 feet and Mach 20 with a one g lateral acceleration capability, can survive against an SA-5 or a Galosh ABM with HE warheads.

d. No manned vehicle can survive in a nuclear engagement.

e. An unmanned Mach 4.5 and 100,000 feet altitude vehicle having a three g lateral acceleration capability can survive against either an SA-5 or a Galosh ABM with a nuclear warhead.

f. An unmanned boost-glide vehicle having a two g lateral acceleration capability can survive against either an SA-5 or a Galosh ABM with a nuclear warhead.

2. Further investigation is continuing to attempt to establish a lower altitude limit at which a Mach 4.5 vehicle can survive with maneuvers in an HE environment. Conceivably, this altitude could be sufficiently low to render improbable the use of a nuclear warhead.

3. The McDonnell Corporation is continuing to generate vehicle configurations compatible with the above profiles and tactics. This effort is scheduled to be completed by 30 November 1969.

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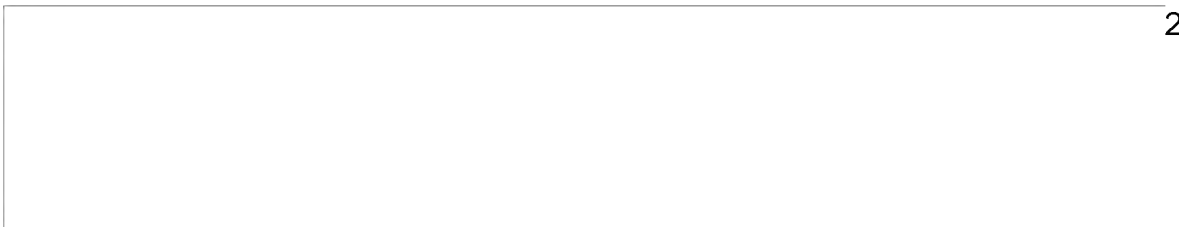
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D. MISCELLANEOUS R&D



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b. On 14 September 1969 a highly productive training mission provided good photographic coverage of the directed targets in the Washington, D. C. and Norfolk, Va. areas.

## II. GENERAL

### A. BLUE GULL V

1. During the period 2 - 4 September 1969, Detachment G deployed a carrier landing configured U-2R, Article 055, to Lakehurst NAS, New Jersey, to conduct ground and flight testing of the carrier arrestment capability with MARK VII equipment. Initial tests at Edwards AFB with M-2 type arresting gear proved unsuccessful due to the discovery of certain unsuitable characteristics of this equipment during U-2R taxi arrestment tests. Subsequent tests with the MARK VII gear proved highly successful and qualified the U-2R for further tests aboard an aircraft carrier. Plans are presently being coordinated with the U.S. Navy for shipboard training operations before the end of December 1969.

2. In conjunction with development of the U-2R carrier capability, one LAC (test), two CIA, [ ] have completed carrier qualification training in the Navy T-2B basic trainer at Pensacola NAS, Florida.

25X1

B. HILL TOP - Five U-2C/G sorties were flown in support of the Office of Research and Development objectives to photograph:

1. Natural resources for NASA to determine which resources can be usefully photographed and identified from space vehicles.

2. Crop production to prove the feasibility of using KH-4 satellite photography for crop estimations.

C. RED DOT - Film Testing - Seven missions were flown with various camera configurations in support of IDEALIST and other national reconnaissance programs as part of a continuing requirement to determine the usefulness of various film emulsions and filters under operational conditions.

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D. HUNGRY BOYS - One flight was flown to verify the warning capability of the System 20 against actual fighter intercepts and to formulate Tactical Doctrine evasive action procedures to counter this threat. The tests were flown with several USAF Air Defense Command F-106 aircraft performing intercepts against a U-2R flying above 70,000 ft.

E. META - Three sorties were flown in support of a U.S. Navy program aimed at verifying the tactical usability of satellite-borne real-time photographic systems to be employed during strike missions. A U-2C specially configured to simulate the acquisition satellite, is used to relay television type photo signals to a controlling ground station which then reproduces the transmitted data into real-time usable imagery. Testing to date has proven highly successful with all test objectives being met.

25X1

III. PILOTS AND AIRCRAFT STATUS (AS OF 30 SEPTEMBER 1969)

DETACHMENT "G" (EDWARDS AFB - NORTH BASE)

Aircraft	4 U-2R
	1 U-2C
	2 U-2G (flyable storage)

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Operations	Conducted at Palmdale until 31 July 1969. Runway repairs at Edwards AFB completed.
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# ROUTING AND RECORD SHEET

SUBJECT: (Optional)

Program Progress Report

FROM:

EXTENSION

NO.

SAS/O/OSA

BYE 9143-69 & BYE 647925X1

DATE

10 October 1969

TO: (Officer designation, room number, and building)

DATE

OFFICER'S INITIALS

COMMENTS (Number each comment to show from whom to whom. Draw a line across column after each comment.)

1.

C/SAS

10/10

10/10

KO

2.

D/OPS

10 Oct

24B

Approval

3.

D/R&D

10/10

Co2

Coordination

4.

D/M

10/10

3AM

Coordination

5.

SAS

10/10

ET

6.

SAS / compa

D/SA

13 Oct

10/10

10/10

Approval & Signature

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